

A Survey on Beyond 5G Network With the Advent of 6G: Architecture and Emerging Technologies

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Abstract

Nowadays, 5G is in its initial phase of commercialization. The 5G network will revolutionize the existing wireless network with its enhanced capabilities and novel features. 5G New Radio (5G NR), referred to as the global standardization of 5G, is presently under the 3^{rd} Generation Partnership Project (3GPP) and can be operable over the wide range of frequency bands from less than 6GHz to mmWave (100GHz). 3GPP mainly focuses on the three major use cases of 5G NR that are comprised of Ultra-Reliable and Low Latency Communication (uRLLC), Massive Machine Type Communication (mMTC), Enhanced Mobile Broadband (eMBB). For meeting the targets of 5G NR, multiple features like scalable numerology, flexible spectrum, forward compatibility, and ultra-lean design are added as compared to the LTE systems. This paper presents a brief overview of the added features and key performance indicators of 5G NR. The issues related to the adaptation of higher modulation schemes and inter-RAT handover synchronization are well addressed in this paper. With the consideration of these challenges, a next-generation wireless communication architecture is proposed. The architecture acts as the platform for migration towards beyond 5G/6G networks. Along with this, various technologies and applications of 6G networks are also overviewed in this paper. 6G network will incorporate Artificial intelligence (AI) based services, edge computing, quantum computing, optical wireless communication, hybrid access, and tactile services. For enabling these diverse services, a virtualized network slicing based architecture of 6G is proposed. Various ongoing projects on 6G and its technologies are also listed in this paper.